REMARKS

This application has been carefully reviewed in light of the Office Action dated March 25, 2002. Reconsideration and favorable action in this case are respectfully requested.

The Examiner has rejected claims 1-2, 5-9, 12-16 and 19-32 under 35 U.S.C. §112, first paragraph, under the reasoning that claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The examiner states that the inclusion of the limitation of "an explosive reaction" between the hydrogen containing gas and the oxygen containing gas is not enabled by the application's specification.

The Examiner has rejected claims 1-2, 5-9, 12-15 and 26 under 35 U.S.C. §102(e) as being unpatentable over U.S. Pat. No. 5,907,188 to Nakajima et al. Applicant has reviewed this reference in detail and does not believe that it discloses or makes obvious the invention as claimed.

The Examiner has also rejected claims 20, 21, 23, 27-28 and 29-32 under 35 U.S.C. §103(a) as being unpatentable over Nakajima et al. Claims 16, 22, 24 and 25 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. No. 5,352,620 to Komori et al in view of Nakajima et al. Claim 19 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Komori et al in view of Nakajima et al and further in view of Wolf, "Silicon Processing for the VSLI Era." Applicant has reviewed these references in detail and does not believe that they disclose or make obvious the invention as claimed.

With regard to the §112 rejection, the examiner contends that the claims recitation of "an explosive reaction" between the hydrogen containing gas and the oxygen

containing gas is not enabled by the specification. Applicants are providing a declaration in support of their contention that the present specification clearly shows an explosive reaction. The specification contains several examples where oxygen gas is mixed with hydrogen gas at a 100% partial pressure. This reaction is an explosive reaction, as is well known in the art (see Affidavit of Lin, attached hereto). As evidence of the knowledge of the explosive nature of O_2 and H_2 under certain conditions, the Nakajima reference clearly states that the explosion limit is a 4% partial pressure of H_2 in nitrogen. Thus, present the specification clearly describes a reaction that is well known as an explosive reaction to those skilled in the art.

With regard to the §102 rejection, the examiner contends (in the section entitled Response to Arguments) that "Nakajima et al teaches the introduction of H_2 at a lower pressure in order to prevent the pressure in the processing chamber to increase beyond a predetermined safe level.... As Applicant has pointed out in previous responses, Nakajima introduces H_2 at a *partial pressure with respect to an inert gas (N_2)*, in order to prevent an explosive reaction between the hydrogen and the oxygen. This is explicitly stated in the Nakajima reference - "...since the partial pressure of the H_2 gas can be set to low pressure (low concentration) lower than the explosion limit, *the H_2 gas can be treated in the same manner as an inert gas*" (col. 6, lines 50-53). Nakajima does not lower the pressure in the chamber to reduce the effects of an explosive reaction between hydrogen and oxygen; instead it teaches the reduction of the *partial pressure* (concentration) *of hydrogen with respect to an inert gas (nitrogen)* in order to produce a reaction that is *non-explosive.*

Further, the examiner contends that the "combustion of hydrogen and oxygen is an explosive reaction in itself and thus it is obvious that any process that includes a reaction between these two elements has to be controlled to maintain a safe level." Applicant disagrees with this contention. *Some* reactions between hydrogen and oxygen are explosive; some are not (see Affidavit of Lin). One skilled in the art could either (1) use

a non-explosive reaction between hydrogen and oxygen by reducing the partial pressure of hydrogen in an inert gas below the explosion limit (as shown in Nakajima) or (2) use a reaction other than hydrogen and oxygen for oxidation.

The present application teaches a process heretofore not used in the industry – oxidizing an insulating layer and a silicon-containing layer using an explosive reaction between hydrogen and oxygen, but doing so in a way that the pressure remains at a safe level (as described in detail on page 6, line 18 through page 7, line 16). This provides higher concentrations of H_2 and O_2 for the oxidation and may be used to eliminate the need for an additional inert gas in the chamber.

Since Nakajima does not show the use of an explosive reaction while maintaining a safe pressure level in the processing chamber, Applicant respectfully requests allowance of independent claims 1, 9, and 26, and dependent claims 2, 5-8, and 12-15.

Dependent claims 20-25, and 27-32 provide three different ways in which the explosive reaction of the gases provided by the respective parent claims can be ameliorated. These claims are directed to reducing drastic changes in pressure and provide a significant benefit.

Dependent claims 20, 22, 24 and 27 describe a specific method for maintaining pressure below a predetermined level. Namely, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced in a portion of a process chamber's total volume, such that the reaction between O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber (as opposed to fully introducing the gases to the chamber prior to igniting the gases). Thus, the reaction is confined to a portion of the chamber where the gases react continuously as they enter the chamber. This leaves the rest of the chamber available for expansion, increasing the safety of the process and enlarging the process window.

Since none of the references cited by the Examiner pertain to the use of a combination of gases that have explosive reactions, nor do they teach the claimed technique, it would not be obvious from these disclosures that the subject matter of these claims could be used by one skilled in the art to reduce the effects of such a reaction.

Claims 21, 23, 25 and 28 describe an additional method of maintaining the pressure of the chamber below a predetermined level. In this case, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced in a predetermined ratio, and the concentration of one of the gases is increased after the reaction begins. This technique can be used to minimize the shock of the reaction to the chamber. The Examiner claims that this method would be in the scope of one of ordinary skill in the art, but offers no support. None of the references cited by the Examiner pertain to the use of a combination of gases that have explosive reactions, nor do they teach the claimed technique. Thus, it would not be obvious from these references that the subject matter of these claims could be used by one skilled in the art to reduce the effects of such a reaction.

Claims 29-32 describe another alternative method of maintaining the pressure of the chamber below a predetermined level. In this case, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced while the chamber is at a low pressure and the pressure is allowed to increase once the reaction begins. This technique can also be used to minimize the shock of the reaction to the chamber. Since none of the references cited by the Examiner pertain to the use of a combination of gases that have explosive reactions, nor do they teach the claimed technique. Thus, it would not be obvious from these disclosures that the subject matter of these claims could be used by one skilled in the art to reduce the effects of such a reaction.

Independent claim 16 and dependent claims 22, 24 and 25 are rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. No. 5,352,620 to Komori et al in view of

Nakajima et al. For reasons stated above, Nakajima does not show the use of an explosive reaction while maintaining a safe pressure level in the processing chamber. The Examiner also cites the Komori reference as using an oxygen-containing gas and a hydrogen containing gas. However, the Examiner correctly stated in the Office Action of October 15, 1999, that Komori did *not* show use of an oxygen-containing gas and a hydrogen containing gas. Applicant believes that Komori was used to show steps in the specific embodiment of fabricating a *capacitor* (Claim 16 and associated dependent claims), but was not intended to show a specific use of an oxygen-containing gas and a hydrogen containing gas in semiconductor fabrication. Applicant has not found any such disclosure in Komori. The examiner cites column 6, lines 34-55 for support, but there is no relevant disclosure in this passage of Komori.

For reasons stated above in connection with independent claims 1, 9 and 26, Applicant respectfully requests allowance of claim 16, and claims 19, 24 and 25, which are dependent upon claim 16. Komori also does not appear to add any disclosure that would be relevant to dependent claim 22, which is dependent upon independent claim 9, discussed above. Applicant respectfully requests that these claims be allowed.

An extension of one month is requested and a Request for Extension of Time under § 1.136 with the appropriate fee is attached hereto.

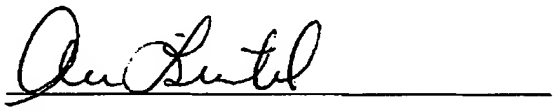
The Commissioner is hereby authorized to charge any fees or credit any overpayment, including extension fees, to Deposit Account No. 01-1615 of Anderson, Levine & Lintel, L.L.P.

Applicants have made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Alan W. Lintel, Applicants'

Attorney at (972) 664-9595 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,



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